WHAT ENGAGES STUDENTS IN METAL-FROG? A TRIARCHY PERSPECTIVE ON META-COGNITIVE LEARNING

By

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ABSTRACT

This paper presents the central ideas of a grounded theory research by the name of Triarchy Perspective on Metacognitive Learning in Free Online Groups, or "TriP on MetaL-FrOG" in short. The research setting was online learning community on the platform of Free Online Group web (FrOG) intended for post-graduate students. The research examined the phenomenon of learning engagement through FrOG portals. It was concluded that three factors contributed to MetaL-FrOG: Motivation, Cognitive Resources and Pro-learning Behaviors. Further analysis revealed these three components to be desired learning outcomes themselves.

Keywords: *Collaborative Learning, Computer-mediated Communication, Human-computer Interface, Learning Communities, Media in Education, Teacher Education.*

INTRODUCTION

Learner engagement is the key to learning success (Herrington, Oliver & Reeves, 2003; Lim 2004). Hence, inducing learner engagement in the setting of online learning communities is critical for increasing learning outcomes. According to Huang (2002), the difference in the setting of online learning from the conventional classroom means different techniques and perceptions must be employed to lead to success. Discussion-oriented, authentic, project-based, inquiry-focused, and collaborative learning are all characteristics of online discussion groups (Ibid). But there are no less pitfalls and factors that inhibit active social learning online (Ke & Carr Chellman, 2006; Mann, 2005), so the issue is what factors engage students in online discussions, assuming intensified social interaction means higher learning (Bandura, 1962; McLoughlin, 2002). Online learner communities, as interacting organizations, inevitably involve estrangement, left-outs, imbalance of power which results in disappointed learners. For example, Mann (2005) described the scenario:

> *"Feel unable to engage or contribute in ways which are meaningful and productive for the realization of their own potential and learning requirements. This may include the experience of feeling held back, blocked, inhibited, estranged or isolated from what they are learning, and the study practices and Learning processes, both individual and social, which are part of their particular learning context"* (p. 43).

This finding of what engages students in online discussion will, in turn, lay the ground work to answer the question "how to engage students in online active learning?" Other social phenomena of online learning that are worth examining: students struggle to appear smart online; fear of misinterpreting communication norms; and uncertainties about appropriate behavior, resources of learning and confidence.

The authors examined students' learning experiences using Yahoo Groups, which was playfully coined as "FrOG" (acronym for Free Online Group Web), by one of the authors in an earlier study (Hussin & Saleh, 2006). For the discussion of this paper, the meaning of the term "FrOG" was not limited to "Yahoo" type online communication portals, but was generalized to cover the unique experience of online learning while using Yahoo Groups as how the participants saw it. As there are many forms of online instructional tools or software, the social context of different online learning communities vary considerably with the myriad of available technologies. For example, distance learning classes rely solely on online

communication, ond conventional classes utilize online communication as an odded resource. The MetaL-FrOG experience in this study belonged to the latter.

1. Literature Review

> *"It is a student-centered learning. I learned by observing my course mates' messages (social learning), solve my own problems (when I'm doing my task 2), it is a self- regulated and discovery learning."* [Entry 966]

Technology and internet provide effective affordances ond a suitable environment for scaffolding human-to-human interoction and engagement (Clark, Sampson, Weinberger & Erkens 2007), an importont and effective mechanism for learning (Bandura, 1962). At higher educotion level, adult students are copoble of consideroble contribution to the class from their work and life experiences. This often entails creating a community of learning and mutual sharing.

Lave & Wenger (1998) describe Community of Practice (CoP) os a group of members who interact regularly to improve (intentional or otherwise) their proctice for mutual concern or a passion. However, upon close examination, MetaL-FrOG is not a CoP in the strictest meoning. There are three criteria of CoP. (1) Domain: This criterio is partially met. Outwordly, MetaL-FrOG is concerned with learning psychology (subject content matter) and how to learn psychology learning itself (meto-cognitive process). Overall, there is much learning taking place, explicitly or otherwise. (2) Community: There is a growing community of Metol-FrOG members. (3) Practice: Criteria unmet, MetaL-FrOG consists of members that seek to associate the MetaL-FrOG leorning experience with their practices. The members came from various backgrounds in this study. Discussions about pedogogical ideas were not frequent.

The use of telecommunications does not automotically foster students' abilities to engage in professional reflection activities with one another (Clift, Mullen, Levin & Larson, 2001). FrOG, os a web-based learning tool provides ease ond support for sociol and reflective learning, but it does not "teach", while the instructor and FrOG members do. MetaL-FrOG is essentially different from usual classroom learning and face-to-face teoching for a number of reasons.

Warschauer (1997) examines five features of Computer-Mediated Collaborative (CMC) learning: (a) text-based and computer-medioted interaction, (b) many-to-many communication (c) time- and place- Independence (d) long distance exchanges, and (e) hypermedia links. These five features ore in contrast to face-to-face instruction where the progress of lessons manoged is subject to content and curriculum development.

Clark (2007) examined five analytical frameworks for measuring participation interaction for online dialogic argumentation ond proposed the following: 1. formol argumentation structure, 2. conceptual quality, 3. nature and function of contributions within the dialogue, 4. epistemic nature of reasoning, ond 5. argumentation sequences ond interoction patterns. Diologic argumentation according to Clark (2007) "focuses on the interactions of individuals or groups attempting to convince one another of the occeptobility and volidity of alternative ideas (p. 343)". The ideos ore applicable and can be extrapolated to MetaL-FrOG to a certain extent.

But according to the authors MetaL-FrOG is unique for the reasons it is not systematic, has no system, not official, do not center on o pre-determined topic, multi-dimensionol and multi-directional, loosely-organized, showing fluidity and unpredictability. This variation and parallelism is understandable in the face of unlimited possibilities of social context of online learning. In fact, onolysis of MetaL-FrOG revealed argumentotive discussion, which appeared to be rare, students were seen to be reserved and "polite" in rejecting another's ideo, typical of the culture in the East (Willioms, 1970), such os that of Malaysia. Negative reactions were observed when an idea wos refuted. For example, Entry 697:

> *"Your idea is not wrong to use Kolb's Learning Styles Model but why you mentioned that you do not agree with mine. Please critique [criticize] mine and give a concrete solution and justify it why THE LECTURE DEMONSTRATION IS NOT APPLICABLE TO BANDURA*

SOCIAL LEARNING. Dear team please give your views too [smiley of crying]".

This is subjected to the differing cultures in which online learning experiences take place. In line with the tenet of meaningful learning, MetaL-FrOG is situation-bound and not content-specific. For exomple, this is different from threoded online forums. The success of MetoL-FrOG is highly dependent on the participants' capacity in identifying "learning nodes", points where potential new learning topics stem from current discussions. It is also dependent on the participants' engagement in exploring the various possibilities of learning experiences. This is subject to the three proposed triarchic components: cognitive resources, motivation and pro-learning behaviors.

Waldeck, Kearney and Plax (2001) isolated the reasons for students using e-mail to interact with their teachers: 1. to clarify course materiol and procedures, 2. as a means of efficient communication, and 3. for personal/social reasons. Waldeck and associates' observation explained the motivotional aspects of e-moil communication learning. Hedrick, McGee and Mittag (2000) onolyzed the communication between university course instructors and pre-service teachers reported through e-mail and identified several themes: 1. instructionol growth, or improvement in their instructional and pedagogical knowledge, 2. emotional attachment, 3. why students failed (the pre-service teachers onalyzed the factors thot led to the increase in failure rate of students), 4. self-evaluation, reflection learning, 5. using what is learned (applying their prior knowledge), and 6. the e-mail experience. By and large, these are observoble features of active MetaL-FrOG. In summory, the previous research identified a number of key themes that explained the online collaborative learning behaviors.

Building on these previous studies, this paper seeks to map new relotional explanations to themes related to engagement within the online learner community. This foundational framework would accommodate and integrote the themes that explore the relationship and interploy of the three inter-dependent components of the Triarchic Perspective (TriP) that determine the success of MetaL-FrOG: cognitive resources, assumed responsibility, motivotion, and lastly, pro-leorning behaviors.

2. Setting and participants

Free online group-web (FrOG), o form of open source online tool, was used as a medium of instruction parallel to face-to-face instruction in the course "Psychology of Learning", under the progrom of Master of Instructionol Technology (MIT), ot University of Maloya. FrOG service is free and functions seamlessly within personal e-mail accounts of users. During this study, a record of e-mail transactions was documented outomatically online at a designated homepoge.

A totol of 16 new participants registered under the paper, however two students opted out at the end of the semester. Voluntary external participants consisted of former students of the progrom, reseorch assistants and reseorch portners of the instructors. The figure of externol participants who posted e-mails to the FrOG was recorded as seven, while a larger number can be positively assumed to hove been engaged in possive participation and vicarious learning through the FrOG.

There were no specified topics of discussion on the FrOG. The FrOG was utilized primarily as a platform for (meto-cognitive cooching (Hussin, Felder & Brent, 2006) by the instructor in order to breok the barriers of learner readiness (Bruner, 1966). Meta-cognition (Flavell, 1976) is "thinking about thinking". The instructor defined the meaning of coaching on the FrOG for the benefit of all the porticipants:

> *"COACHING is an intensive form of instruction, one which relies on inter-personal and guided-intra-personal skills to steer learners to reach personal and collective goals."* [Entry 947]

In this instonce, the desired "personol ond collective goals" refers to the class subject content matter, which was the psychology of learning, specifically the application and considerotion of psychological understanding through the use of instructionol technology. Meta-cognitive coaching, therefore, means coaching by the means of self-analysis of everyday occurrences using psychology theories or concepts.

Some reseorchers criticize online educotion to be impersonal, negligent of "learning" and over emphasized on the dispersion and acquisition of information (Bowers, 1999; Noble, 1998; Woody, 1999). MetoL-FrOG is different, os there is no predetermined curriculum. In foct its "success" is decided and characterized by intense social interoction.

The contents of MetaL-FrOG revolved primarily around issues of meto-cognitive cooching ond leorning, personol lives or olso known os "intimocy" (Woldeck et ol, 2001), course-requirement related communication which included discussion, comments, clorificotion, procedurol enquiries, os well os problems foced in the course of ossignment completion ond finol exominotions. Both responses at emotional (e.g. complaints, laments, sign of grief, frustrotions, inferiority ond seeking emotionol support) ond cognitive levels (e.g. rotionol onolysis) were common and often interwoven in one e-mail. No categorizotion of FrOG entries were mode bosed on subject content motter during onolysis, os one emoil often contoined responses with references to multiple subject topics.

2.1 Advantages of using FrOG

Convenience

- FrOGs ore free open source freewore, occessible with any computer and internet connection. Students are reodily fomilior to this medio, ond need no troining or prior knowledge of usoge (Dohlon & Hussin, 2005).
- There ore specific instructionol feotures embedded in the Yohoo FrOG thot promote productive interaction between participants (Clark, 2007), including usability, user interfoce feotures, documentotion, storoge ond shoring of intellectuol work, focilitoted occess to information (e.g. hyperlinks), and scripting tools (e.g. smiley foces ond formotting conveniences).
- FrOGs allow asynchronized learning, time and locotion independence. Written communicotion enobles ongoing future sourcing of informotion, time to draft, refinement and elaboration of well-conceived entries (Clork, 2007; Joiner & Jones 2003; Morttunen & Lourinen 2001; Scordomolio & Bereiter 1994; Schellens & Volcke 2006; Veermon 2003, Woldeck et ol 2001, Warschouer 1997), FrOG communicotion allows "time and space" for learners' reactions (Dahlan & Hussin, 2005).
- The use of personal e-mails engage the learners 24 hours o doy ond 7 days o week, providing access to continuous cognitive ond sociol support which motivotes further participotive-learning. This feature enobles "Osmosis Learning", in which learners immerse in a context soturoted with leorning inputs, obsorb ond equolize their level of locking knowledge to thot of higher knowledge (Hussin, 2004).
- Online vicorious leorning by observer-porticipont. Virtual partial participation in a community of learning without octuol physicol presence. In this reseorch, for exomple, some porticiponts were octively involved in the MetaL-FrOG, yet it is not officially registered and paying students in the course.
- Training in writing without the intimidating formality of on-poper write-ups. This is especiolly useful in Asion culture where foce-to-foce instruction is often impeded by typical Asian behavior of being shy and reserved (Williams, 1970). FrOG based coaching removes oll such barriers (Hussin, 2006).

Rapport

- Online medio promotes informolity ond intimocy, which helps to foster ottochment omong the leorning community members (Hedrick et al, 2000).
- FrOG communicotion encouroges voluntory participation, independent learning and self-motivated leorning, os opposed to the typicol spoon feeding leorning culture prevolent omong Asions (Willioms, 1970).
- Sociol leorning, where students bench-mork ond model eoch others strengths is common in MetoL-FrOG.
- The osmosis leorning requires ottention os o whole from the instructor as well as from the FrOG community. A FrOG entry gets the attention of every FrOG members and the instructor con give ottention to oll of his / her students ot the same time. This is olso known as "mony-to-many communication" (Warschauer, 1997).
- MetaL-FrOG nurtures peer support. Consistent with the Asion culture of collective leorning (Willioms, 1970),

students have been observed to provide peer comments ond help each other in their assignment completion.

Multiplicity

- There is fluidity and flexibility in the use of FrOGs, indicating open and democratic culture. The dialogue transactions are accommodating, from greetings, to joking, to officiol onnouncements, to academic discussions, and even to standard procedural information.
- FrOG based coaching is able to change the direction of instruction from teacher-centered (one to many) to student-centered (many-to-mony). FrOG members often take up the role of instructor or leoder by offering assistance to other FrOG members. For example, it was observed in this research study, that the instructor herself wos at the receiving end of such benevolent "teoching" [Entry 857], when o passive student-participant exploined thot "DDL" (Direct Download Links) referred to an operating system feature in Microsoft Windows.
- FrOG leorning processes create continuity and consolidation of past learning experiences by providing automated documentation for future learners, including ony accidental interested parties.
- Internal and external factors shape and reshape the culture and direction of MetaL-FrOG. For example, in this study, the porticipotion of external members, who contribute from their differing perspective, background ond knowledge, was observed to have changed the direction of the FrOG discussion.

3. Background of the researchers

The first author was o voluntary external observer / participant who never officially attended ony course under the instructor. He olso never met with the other FrOG participants in person. The second author was the instructor of the course, an ongoing action-researcher who studied her own instructionol opproaches and her students' learning processes for continual instructional improvement. Ongoing analysis of the instructor's teoching approoches (either by the students or the external participonts) were continuously posted on the class FrOG portal as a part of Metal-FrOG learning to trigger leorner reflection [E.g. Entries 416, 419 and 421].

At the end of the semester, there were increased opportunities to reflect on the students' active MetaL-FrOG experiences. For example, one external participant had put forword his ideas on the FrOG portal, sharing his learning experience using FrOG [Entries 947, 964]. Subsequently, this initial post triggered intense ond heated discussion [Entries 957, 1000, 1003, 1004, 1005, 1010, and 1014].

Both authors ployed different roles within the MetaL-FrOG community in this study. The first author maintained a substantial observer distonce, participated moderately online to ensure access to the naturalistic social context, gleon genuine insight, and produce comprehensive live analysis. Absolute objectivity ond detachment in this case would not have been appropriate, as it would have induced foulty interpretation of observoble doto. According to Marohaini Yusoff (2001b), field doto cannot be taken-out-of-context, as many of the implicit and subtle social clues can only be understood in-the-process by the insiders, and are invisible to (ignored by) on absolute externol observer.

The role of second author / instructor was that of a "hopelessly occulturated insider" who "accepts as natural and proper the very things. An ethnographer from our own society is not so totally familiar with and might want to question (Wolcott, 1987, p. 57)". Wolcott odvocates that the researchers must be willing to be fully immersed in, and be able to totally embrace her own research, to be able to fully understand the research itself (ibid). Therefore, it was important that both the authors of this paper work in tandem. The second author was the key active porticipant. The first author provided validation to the joint analysis of this reseorch study. This synergetic cooperation was vital in ensuring that neither author "run wild" ond lose touch of reality.

4. Methodology

The e-mail transactions used for this study recorded the spon from Entry 391 (14 July 2007) to Entry 1103 (28 November 2007), which brings to a total of 712 e-mail entries. Earlier entries were from previous cohorts of

participants, not studied in this case, but acknowledged as prior cohorts in earlier cycles of this overall action research. The messages referenced in this study were encoded according to the entry number as how they were originally documented in the FrOG website for easy referencing. The message numbering service in the FrOG enables automated documentation of e-mail transactions, thus eliminating possible errors in the process of data collection, which are otherwise inevitable in interview and other observational methods.

The methodology used in this study was a qualitative grounded theory approach. Recent increased interest in online learning research has resulted in an increased interest and use of qualitative methods to obtain deeper understanding of the subject, was especially in the area of students' perception of the experience (Bianco & Corr-Chellman, 2002). Specifically, the terms such as phenomenology, ethnography and content analysis are applicable to this study. Phenomenology (Creswell, 1998) enables researchers to gain deeper understanding as the participants see it. In this study, the importance of descriptions by the participants as well as their reflections on the learning experience, as reported on the FrOG, was emphasized. As ethnography involves descriptions of human social phenomena, routines, interaction and cultures from fieldwork (Spradley, 1979), the online learning environment in this study, the FrOG electronic "field", is legitimized (Bianco & Corr-Chellman, 2002), which differs considerably from conventional observation fields such as school or work place.

The authors examined the FrOG data with the intent to form a theoretical framework that would explain the phenomenon of MetaL-FrOG using the grounded theory approach (Glaser 1992). As advocated in grounded theory analysis, the theoretical concepts formed from this study were generated from the data itself.

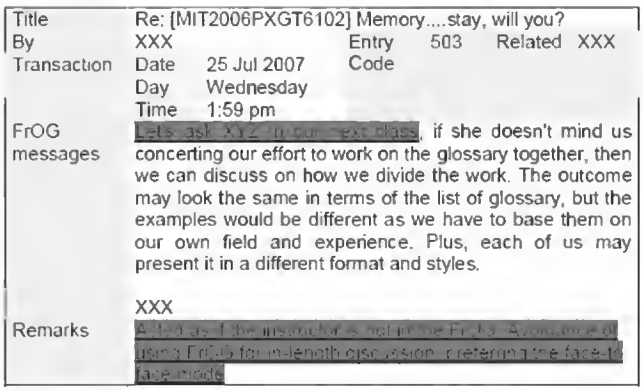
Observation of online learning is essentially tricky as Bianco & Carr Chellman (2002) put it,

> *"How is it possible to observe an online class? Do we observe individuals at their machines in their house space? Do we observe the class as it interacts online? Is the electronic space of the actual classroom a virtual "field"?* (p. 256)

Hereby, it can be argued that online research is indeed partially document analysis (Hodder, 1994), not purely observational. It can be further implicated that if online discussion is highly formal and systematic, there are no social cues to be analyzed. The informal nature of FrOG in this study enabled substantial non-subject based information to be researched (emotions, relationships and other social cues).

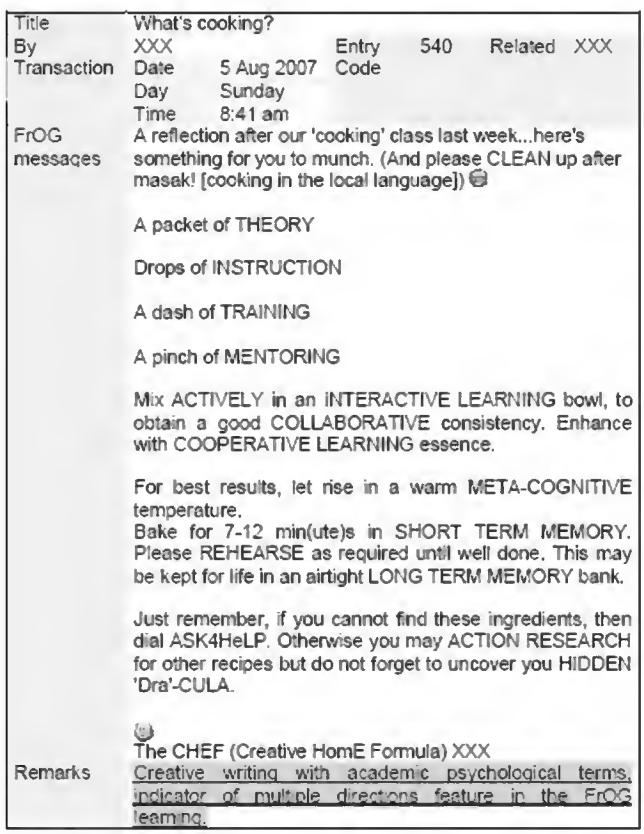
A total of 712 e-mail entries were encoded using a custom designed Transaction Transcript Documentation (TTD), a content analysis tool. This TTD was modified based on the original prototype design by the second author in an earlier research study on Short Messaging Service (SMS) based learning (Hussin, 2004). Preliminary analysis resulted in the formation of a global framework, the Triarchic Perspective (TriP), which consists of three components: cognitive resources, motivation and pro-learning behaviors. Then subsequently, the authors realigned their focus onto data related to only the three components of TriP, and relegated other unrelated information to be kept aside for potential future studies. Lastly, as advocated by Strauss & Corbin (1990), the descriptive excerpts from the FrOG were presented in this paper, mainly to illustrate the phenomena and to validate the relevance of the proposed framework, rather than to prove it (Ibid).

The second level of analysis followed once the three components of TriP were identified. Each individual entry was scrutinized to identify the presence of the three angles and coded with different colors: yellow for cognitive resources, red for motivation and blue for social learning behavior. The raw text was separated into smaller chunks, isolating phrases that contained markers for each category. In line with the recursive nature of qualitative research and grounded theory (Marohaini Yasoff, 2001a), the TriP model was refined and modified with each level of analysis according to the emerging themes. Consequently, the relationships between the three angles were analyzed by inductive and deductive reasoning. Figure 1 and 2 are some examples of the TTD rubrics:



Title	Re: [MIT2006PXGT6102] Memory....stay, will you?					
By	XXX		Entry	503	Related	XXX
Transaction	Date	25 Jul 2007	Code			
	Day	Wednesday				
	Time	1:59 pm				
FrOG messages	Lets ask XYZ in our next class, if she doesn't mind us concerting our effort to work on the glossary together, then we can discuss on how we divide the work. The outcome may look the same in terms of the list of glossary, but the examples would be different as we have to base them on our own field and experience. Plus, each of us may present it in a different format and styles. XXX					
Remarks	A lead as the instructor is not in the FrOG. Avoidance of using FrOG for in-depth discussion preferring face-to-face mode.					

Figure 1. Sample Transaction Transcript Documentation (TTD) type blue - social learning behavior



Title	What's cooking?					
By	XXX		Entry	540	Related	XXX
Transaction	Date	5 Aug 2007	Code			
	Day	Sunday				
	Time	8:41 am				
FrOG messages	A reflection after our 'cooking' class last week...here's something for you to munch. (And please CLEAN up after masak! [cooking in the local language]) A packet of THEORY Drops of INSTRUCTION A dash of TRAINING A pinch of MENTORING Mix ACTIVELY in an INTERACTIVE LEARNING bowl, to obtain a good COLLABORATIVE consistency. Enhance with COOPERATIVE LEARNING essence. For best results, let rise in a warm META-COGNITIVE temperature. Bake for 7-12 min(ute)s in SHORT TERM MEMORY. Please REHEARSE as required until well done. This may be kept for life in an airtight LONG TERM MEMORY bank. Just remember, if you cannot find these ingredients, then dial ASK4HeLP. Otherwise you may ACTION RESEARCH for other recipes but do not forget to uncover you HIDDEN 'Dra'-CULA. The CHEF (Creative HomE Formula) XXX					
Remarks	Creative writing with academic psychological terms, indicator of multiple directions feature in the FrOG learning.					

Figure 2. Sample Transaction Transcript Documentation (TTD) type yellow - cognitive resources

Given the complexity, uncertainty ond abstroctness of the nature and subject of study, holistic ond explorative methodologies were employed to answer broad and general research questions. The findings should pove the foundotional base for future reseorches thot study and linear in answering a single, specified and definite research question. But the possibilities of such a research is in question as the subjects involved are reol-time students studied in noturolistic context (Marohaini Yusoff, 2001b). The social context of this research fits the description by Merriam, "holistic, multi-dimensional and ever-changing; it is not o single, fixed objective phenomenon woiting to be discovered, observed or measured (Merriam, 1988, p. 167)." This grounded theory approoch research purposes to form a hypothesis, rather than testing a hypothesis (Merriam, 1988). In Grounded Theory opproach, the performed hypotheses or forming hypotheses in advance are prohibited (Glaser & Strauss 1967).

4.1 Bias Controls, reliability and validity and research limitations

Analysis was directed to the entries as they were presented on the FrOG, thus, automaticolly excluding factors such as personal preference, conflicts of interest and bias based on physicol appearance. The first author's non-registration in the course minimized the risk of transference or injecting past personal experience into the cohort of study. Additional measures included member-checking within the FrOG where participants agreed to confirm or dispute the meaning of the entries as they were analyzed and publicly displayed as a subsequent entry on the FrOG, to keep misinterpretation in check. Secondary relevant sources of information, such as the learning journals from students, were also anolyzed to provide triangulation to the findings.

This research was carried out within a specifically chosen establishment, an Educational Psychology course under the progrom of Masters of Instructionol Technology, at a public tertiary institution, on the platform or portal of Yohoo Groups. Generalizotion and degree of external volidity of the findings into other subjects of studies, teoching approoches, nature and level of training is possible but not without discreet consideration. It is suggested that further research could be carried out in different establishments with similar environments by different researchers with differing backgrounds and knowledge for comparison purposes.

Intrinsic to the nature of qualitative research, the findings from this study could be vostly different if the some raw

data be presented ta ather researchers. Furthermare, limited by the inability to prove causal relationship as in qualitative research, the findings, if alluding to cause and effect in relatianship, were derived fram inductive reasaning ar findings af ather experimental research. Far example, pro-learning behaviours were assumed to contribute ta the increased learning engagement in this FrOG study.

5. Findings

5.1 The overview of TriP

The analysis of MetaL-FrOG followed this thread of logic: Why did students engage actively in the Metal-FrOG? Why were some students not as motivated as the others? Could they have perceived the inadequacy in themselves and balked at the idea af being ridiculed? Even if the students passessed the knawledge and analytical skills, did they always contribute to the Metal-FrOG? How social are the FrOG members in terms of scaffalding each athers in their learning?

The actual research analysis included the grauping and independent inspection of the FrOG entries under the three major components as shown in Figure 3. However this paper only presents the overall conceptual framewark.

Based an the series af research questions, the emergent answers that surfaced pointed the fact that these three components did not just contribute to FrOG engagement, but they were inseparable and farmed the desired learning autcames themselves. There were abundant reports from students describing the changes in their motivation, instructional growth, emotional attachment, meta-cagnitian and analytical skills in the FrOG data (Figure 4).

Mast af the data that were analyzed cantained observable behaviors that could be categorized under two or all three of the TriP components. For example, entries that recarded helpfulness af ane student tawards another could be categorized as providing a cognitive resource or it could be a motivation, and helpfulness itself is definitely a pra-learning behaviar. Far example, the authars decided ta categarize generavity (helpfulness

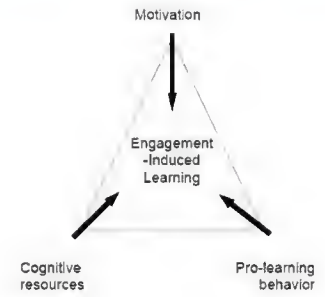


Figure 3. Basic Triarchy Perspective Model

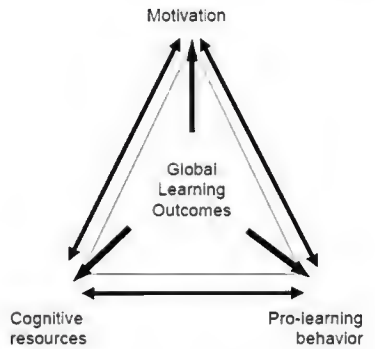


Figure 4. Interaction of the Triarchic components

towards a lower ranking member) under intrinsic motivatian but clasely-linked ta social skills.

5.2 TriP component: Cognitive Resources

Figure 5 shows the model of Cognitive resources for Metal-Frag.

> *"Psychology of Learning...Very interesting subject. I am applying what I have learnt in my jab naw!!!"* [Entry 1071]
>
> *"Every ane else is (moving) sa fast - I didn't understand what they were analyzed(ing) at."* [Entry 975]

Engagement in dialogic argumentation is a powerful pedagogy to enhance understanding of challenging concepts (Andriessen, Baker & Suthers 2003; Clark, 2007; Driver & Osbarne 2000; Hogan, Nastasi & Pressley 2000; Leitão 2000). In the context of this study, this includes, but is not limited to, meta-cognitive thinking and psychological learning, as well as training students in argumentatian and reasoning skills (Baker, 2003; Bell, 2004; Kuhn, Shaw & Felton 1997; Teasley, 1997). MetaL-FrOG messaging, according ta the instructar, was:

> *"A catalyst, a non-human "Instructor", a Radical Canstruct that I created, but that has frag-leaped ta*

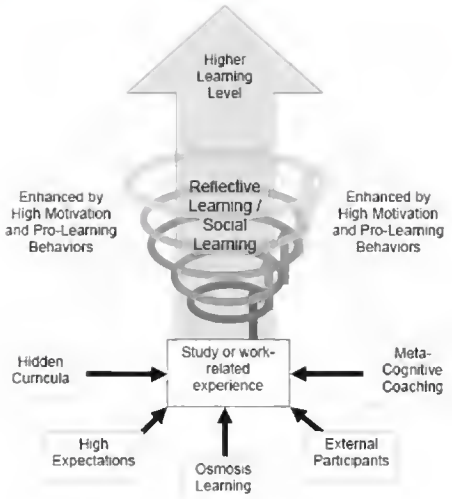


Figure 5. Model of Cognitive Resources for MetaL-FrOG

become self-empowered... "If" provides "instruction" without "me". [Entry 1000]

For the category of "Cognitive Resources", the researchers sought to answer the following questions:

1) What were the sources of knowledge and meta-cognitive analysis as reported by the participants? 2) What enhanced the sources of learning to encourage higher learning outcomes as reported on the FrOG?

The student participants in this study possessed a variety of knowledge bases, ranging from past work experience, to current work experience, to personal lives, to assignments given under the course or other courses or workshops under the program, to high expectations of the course, to shared experience among the FrOG community, to contribution by the external participants, to continuous coaching from the instructor (Osmosis Learning), to peer supported meta-cognition, and lastly, to the online setting of the discussion. According to Clark (2007), this last factor, the online context, results in greater access to the unlimited World Wide Web. Collectively, these factors, or bases of student cognitive resources, gear the students towards higher levels of cognitive learning.

"I just free to check my email today (busy with school training." [Entry 1078]

The opposite of cognitive resources is pre-occupation. When a student is pre-occupied and engaged with other non-academic related experiences, avoidance and withdrawal behaviors might happen. Job demands and personal schedules make adults learners difficult to have on-campus classes according to Brey (1988) & Porter (1997) in Huang (2002).

Language barriers were obvious, as students reported their inadequacy in English. One student admitted frequent checking of a dictionary in order to understand the MetaL-FrOG entries. Many entries saw mixed languages (Malay, the local language and English languages) in one e-mail, showing the intent to participate and overcome their language (culture) differences and lack of confidence stigmatized from the inadequacy. While some struggled hard to assimilate into the majority culture, some opted out from the game. Following is an entry directed to the instructor:

"I know u don't accept excuses. I've tried to overcome some of the 'excuses'. Hopefully I can (be) actively involved in the discussion though my comment could be very 'surface'." [Entry 465]

"Prospective teachers often want the visual reassurance that face-to-face communication can provide (Clift, 2001)." Writing and posting personal learning and reflection, as well as organizing e-mails are new paradigms of learning for many. As Mann (2005) noted "new medium of communication entails new communication conventions, which may be unequally known... potentially carries a greater potential for communication breakdown (p. 47)". The communication and cultural barriers also limited cognitive resources, as many members reported discomfort with online communication, preferring the conventional face-to-face mode. As a post-mortem analysis of the course, one member suggested more:

"face-to-face class / mentoring to survive the duration of the learning graph, taking note that for most of us our learning curve is not steep" [Entry 1067].

5.3 TriP component: Motivation

According to Huang (2002), adults have high learning motivation when they can gain new knowledge, to help themselves to solve important problems in their life. What

drives students to contribute and learn from MetaL-FrOG? The desired answer is of course the intrinsic need from the FrOG community to participate and learn. In fact, MetaL-FrOG itself was an embodiment of the teaching philosophy of Osmosis Learning, which according to the instructor, was, "learning through involuntary absorption from one's environment (Hussin, 2004)." This definition shows that the Osmosis Theory of Learning is based on intrinsic motivation. "The majority of such innovations foil because the teachers, even after considerable period of time and change, simply abandon the new behavior and return to comfortable old routines" (Von Eekelen, Vermunt & Boshuizen 2006)

Much as the instructor cherished hopes that the FrOG would be self-motivating and "an end to itself", the fact that the FrOG discussion come to a standstill after the final semester grades were published refutes the unrealistic thought. However, the pause on the FrOG discussion does not necessarily discredit its role in being a catalyst for motivational growth among the students in the long run. As everyone has a life to adapt to and is constantly seeking new learning experiences at different stages of life, the cognitive changes incited by the FrOG experience may very well be permanent within the students.

For the category of "Motivation", the researchers raised the following questions:

1) What motivated participants to engage on the FrOG discussion as reported on the FrOG?

2) Could these motivations be categorized by the degree of strength? In this case, intrinsic motivations were assumed to be more valid and provide a stronger drive for participation.

The categorization of motivational levels was to provide a framework for understanding hierarchical stages. The desired outcome was to move upwards towards a higher level of learning as the students engage in the FrOG discussion. The categorization was not exclusive of each other, as people often change their intent and motivation at different times. Furthermore, very often, the quantum and onset of motivation could not be gauged from the FrOG entries, as asynchronized online discussion was found to entail a considerable amount of deliberation and pretense. The categories of motivational levels and learner types observed in this study are presented in the following subsection.

Intrinsic Motivation

There were three characteristics observed under this category. Students were driven by indirect gains such as self actualization, generativity and free will. This motivation, self initiated by proactive learners, was least influenced by direct rewards and punishments.

Self-Actualization means self fulfillment and the motivation to realize all one's potentials (Maslow, 1970). The learner gains self satisfaction from his or her own drive to be creative, unique and in pursuit of future growth. For example, the following entries were considered consistent with self-actualization motivation:

> *"My long time aim is to be a well-known researcher in education field.... examining relationship between human cognition and multimedia learning."* [Entry 407]
>
> *"In fact all of us have to explore more and understand psychology of learning so that we can be come an effective learner."* [Entry 450]

Generativity is a concept inspired by the Stages of Psychosocial Development Theory by Erik Erikson (Erikson, 1982). According to Erikson, during middle adulthood, people go through a developmental stage called "Generativity versus Stagnation". Generativity is a preferred condition where someone takes charge of and contributes to other societal members. This form of "sharing" was a notable culture in this FrOG study, which probably could be linked to "collectivism" in Eastern cultures. This was observed when members of the class FrOG volunteered their personal help or resources to other members, for example: the use of personal computers, offers to sleep-over for group discussions, peer comments and kind reminders of broken hyperlinks in assignments, and assistance in technical glitches for the slower members. The participation of external members who had no direct connection to the registered class also

indicated the presence of "Generativity".

Lastly, the spirit of enquiry, or the "free will" to learn was the most evident initiator of intrinsic motivation. Van Eekelen (2006) defined the will to learn as being "alert and mindful". He differentiated it from "interest and motivation" which in his words, "are important concepts but not synonymous with the will to learn" (Ibid). According to Van Eekelen and associates, specificity in interest and motivation has a narrowing function on the learning process. The analysis in this study identified two behaviors as key indicators of this motivation. Firstly, e-mails that referred to a distant e-mail before an act coded as "echoing"; and secondly, were references to multiple previous entries in one e-mail, which we coded as "multiple referencing". Both indicators exemplified "internalization of learning" and "mindfulness" of the students as explained by Van Eekelen in the face of new entries that overwhelm the FrOG members everyday.

Social Motivation

The social need to participate and not to be left out was a major reason for active discussion and sharing on the FrOG:

> *"I would like to add more. When I see the new discussion postings, I become more motivated to post my ideas on the forum."* [Entry 419]; *"It made me nervous to see so many interesting discussions in progress."* [Entry 421]

Students often complained about the level of difficulty and the large amount of assignments in the course. The FrOG provided a conduit of social support to help students to get through the course, as shown by the excerpt:

> *"Really hope that we can work together and help each other to get through the course... Now I am kind of skeptical towards my own capability.... but really don't want to drop the course... huhu.... Please help me."* [Entry 400]

Hypocrite Motivation

This motivation was triggered by external and direct motivations but was concerned with the outward impression of the learners by others. It was driven by recognition, reputation and better grades. The majority of learners fell into this category at most of the time. As exemplified in the FrOG entry below, the importance of FrOG participation was stressed by the instructor many times. *"ALL messages are graded... EVERYTHING is a part of life-long learning."* [Entry 412]. It is unclear, however, that such over temptations encourage or discourage higher learning.

This prompted the students to be motivated to participate in the FrOG discussions. However, once the validity period of this trigger ceased, the resulting motivation also disappeared, revealing the "hypocrisy" of this type of motivation. The most direct proof to differentiate this category from Intrinsic Motivation and Direct Motivation would be the long pause in FrOG messaging activities after the course grades were finalized and published. There were little or no more messages posted by any of the registered students. This proved that students perceived the FrOG discussion to be a part of their course requirement inspite of their own numerous claims of being intrinsically motivated, as they had previously posted on previous FrOG messages.

Direct Motivation

Direct Motivation involved being driven by direct rewards, such as receiving good grades, and avoiding punishment, such as receiving criticism. This category could probably be associated with sporadic learning and uncertainties in learning direction, also known as "reactive learning", which is almost spontaneous and largely unplanned (Van Eekelen, 2006). In other words, the students were not actually "empowered" but merely responding to the requirements of the instructor, in their expected role as students. This entry by an external participant-observer and peer-reviewer captured a clear example of such Direct Motivation:

> *"The argument here can be a reverse one. If the actions of the participants are merely linear in that they proceed to achieve a stated goal as they have agreed earlier, then the test of empowerment can be questioned"* [Entry 985]

Unknawn Mativatian ar lack af mativatian

There were ane ar twa students wha never pasted any entries on the FrOG, ar drapped aut altagether. Their absence in the online discussion could not be understood ar explained, but was recorded as non-active participatian, rather than amitting from the data findings.

5.4 TriP component: Social Learning Behavior

> *"Dear Firuz, Sen Fa and all, Can I try to explain from sociolinguistics viewpaint?"* [Entry 1043]

The MetaL-FrOG excerpt abave, a typical apening text ar introduction to the body of a MetaL-FrOG posting, illustrates the courtesy and pro-learning skills observed are presented in almast all FrOG cammunicatian. This skill is best described as "recagnitian", as it gives attentian and due credit to previous contributors. Such "recognition" is rudimentary to "collaborative learning". A specific type of learning that effectively enhances analytical skills, communication and high level thinking (Bandura, 1962; McLoughlin, 2002).

Social Learning Behaviors include any appropriate behaviors that could contribute to greater social learning success. Far this categary, the researchers raised the following questions:

1) Can pro-learning behaviors and undesirable learning behaviors be identified?

2) Can these behaviors be categorized in relation to their effects on the MetaL-FrOG?

According to Mann (2005), online communication tools can suppart sacial demacracy in educatian. Strang relatianships and the building af a sense af cammunity between learners will enhance students' motivation and engagement. For example, in one entry that analyzed the MetaL-FrOG experience, ane member apined that same members express themselves better in writing. Thus, allowing them to become more "social" studying online than in a conventional classroom. However, Mann (2005) also warned about the negative effects af aver emphasis on core values in privileged communities. He warned," it ignores the effects of unequal power relations within such cammunities, the canfarmity required ta reach consensus on belonging to a community, and a consequent homogenization of difference (p. 45)".

In shart, aver-emphasis in cammanness and belanging oppresses personal uniqueness and one's identity. In this study, description was not alien to the FrOG discussions. As ane participant nated, language barriers had deterred some members from participating an the FrOG discussion, reducing these students to become a minority graup. Hawever, ather implicit factars, ather than language preferences, cauld have came into play. Haw did the students overcome these challenges and contribute to active discussion? This central issue, cancerning sacial perceptian and behaviars, was examined fram bipolar angles. The following are the findings, beginning with the negative, more obvious abservatians.

Undesirable social learning behaviors and experiences

The social behaviors depicted on the FrOG were not all rasy pictures. The MetaL-FrOG experience, being characterized by the intensity af sacial interactian, was not without negative consequences. Members were observed to experience critiques, embarrassments, dismissal, denials and ather cammunicatian negativity, implicit or explicit, while themselves, inflicting pain to others at the same time.

However, a distinctive line was drawn between the punishment behaviors and undesirable social learning behaviars itself. Same af the messages, in which negative experiences (such as shame, embarrassment and pain) were consciously inflicted onto other members, were actually a part of the coaching pracess by the instructar, with the intent to eliminate undesirable behaviors altogether.

Undesired social learning behaviors often received "punishments" from the instructor. Examples of undesired behaviars included plagiarism fram the internet, undue credit ta the ariginal saurce af quatatian, citing secandary sources of citation, pending or discontinued discussions, and aggressive online behaviors.

"Pending", as a theme under social behavior, could best be described as irrespansible questianing, where a member simply asked a questian withaut any fallaw up

effort to solicit answers or explonotion from the FrOG community. It showed a lack of enquiry spirit ond the absence of "researcher attitude".

"Discontinued discussion" is best described as the act of bypossing previous discussions and causing readers to become lost, not knowing which thread of discussion the latest message would refer to. In this study discontinued discussion, as an initiative behavior was considered "bod", os it did not recognize former contribution, and resulted in a phenomenon known as "dispersion". Dispersion is a FrOG phenomenon where the participants refused to reply the antecedent e-moil but initiated a new strond of messages. This often confused the reoders as the multitude and multiplicity of FrOG discussions rendered the readers lost without cues from former discussions. Furthermore, it circumvented issues by not recognizing original contributors, rather "off-putting" experience. This finding was validated by observation from on external member:

> "*Online Discussion Thread: Unexplored unless prompted. Many initiators but no pick-ups nor momentum. No readiness for intellectual discourse.*" [Entry 820]

Verbal aggression was rare, but was observed, including complaints ogainst assignment group members. This candid expression of conflicts, generally stirred a feeling of uneasiness among oll the FrOG members. A specific aggression, coined by the theme "vague aggression" wos observed where an entry criticized without direction to any particular receiving party. The meoning was vogue ond unspecific. The detrimental effect was thot every FrOG member become suspect and perceived the critique to be personal, os shown by the excerpt below:

> *"Besides, I think we should always keep in mind the feelings of people when we post messages. Etiquette is (the) most important."* [763] (Who? Referring to which entry? Was it me?)
>
> *"The follow up to messages seems to have gone haywire. So the question now is whether everyone is aware of the right and proper use of technology or is it a process of hit and miss as what I see happening in this class."* [Entry 767] (Everyone? The instructor?)

Desirable social learning behaviors

> *"I especially like the posting by XYZ, who started a landslide dialogue on semantics (although I am NOT sure if that is the most appropriate theory to refer to for this case)"* [Entry 507]

Did the students know the expected behaviors on the FrOG? The answer is, yes. The posting above clearly depicted the desired discussion outcome-responsiveness. The message aptly described the successful response as "landslide dialogue" ond positively reinforced this type of behavior at the beginning of the class.

Subsequently, skillful FrOG ployers often identified "learning nodes" and explored the possibilities of potential discussion. Often this meant, asking for clarification or showing interest in one part of another's posting. This at times required the participants to play "pretend" and adjust to other participant's levels. In one instance, a porticipont was clearly confused and misinterpreted the meaning of o former discussion. However, the mis-interpretation or "mistake" was not punished or rectified by anyone. Instead, the wrong doer was encouroged into further elaborate on his erroneous interpretations and the initial "mistake" eventuolly blossomed into a new topic.

This was an example of how cooperative behaviors from others could steer a digressed discussion into another fruitful learning opportunity. While this tolerance was critical in encouraging multiplicity and a multitude of MetaL-FrOG discussions, notably contributory to "bronching" of topics, it wos not without the cost of slacking in conceptual accurocy. Branching wos a phenomenon when one participant digressed from the core topic ond the "branch" developed to be another core topic on the FrOG. Branching is considered good if the new topic leads to fruitful discussion. However, too much branching and no further development equals to 'dispersion' as exploined under the undesirable behaviors.

The interactive learning process wos also noted to produce imitation behaviors. "Modeling" (Bandura, 1962)

happened when the students imitated the behaviors of the instructor and the external members. Modeling was observed to have happened in the areas of text formatting as well as writing styles. For example, the imitators started using bold text and capitalization to emphasize key points in an entry, as well as writing in short and poetic sentences. However, the imitation process worked in multiple directions. The instructor and external participants were also observed to imitate the students as well. This reciprocal act, which was coded as "mimicry" under this research, was similar to the "reverse osmosis" phenomena as reported by the second author in an earlier study (Hussin, 2004). Such downward imitation was found to establish positive "interpersonal relationships" (IR), an important ingredient in instilling intimacy and cooperativeness among the FrOG members (ibid). Mimicry was observed when common and favorite expressions were used by the instructor and the external members.

In summary, the pro-learning behaviors could be grouped under three major categories:

Proactive behaviors (key word: initiative)

Examples: initiating a new discussion, inviting others for analysis, urging for participation

Reactive-initiating behaviors (key word: enriching)

Examples: branching, redirecting to the core of discussion, identifying a new problem, asking for clarification, providing alternative explanations, correcting mistakes, arguing

Supporting behaviors (key word: extending)

Examples: revising earlier ideas, giving examples and elaborations, completing others' ideas

5.5 Continuation and Consolidation of Learning Experience

> *"To prepare us as to what to expect as the end product you let us have a look at the previous students' work"* [Entry 416]

This entry illustrates how the students 'discovered' and browsed the MetaL-FrOG entries of previous cohorts from the year 2006. The MetaL-FrOG process was well documented for future learners and anyone interested. The instructor had tapped on the potential contribution of external participants, mostly former students. The cohort of this study was reported to produce an increment from 375 entries (2006) to 714 entries (2007). The maximum jump was a substantial 90.40 percent for the number of entries between July and November from the former cohort in the year 2006 (a comparison between two consecutive years).

Students reported higher motivation and changes in their instructional growth. The most striking learning was the number of students who reported replicating the FrOG methods in their own schools (the member was a teacher). Application of an instructional method experienced at post-graduate level to primary, secondary and other colleges was a sign that lends proof to the multiplicity feature of the FrOG.

> *"For me, I really got an idea from what PQR had shared in the FrOG. I will use it and try it out in my Secondary 2 BM class next year. Then [I] will share with you guys about the results later on."* [Entry 1037, Note: PQR proposed to use a similar FrOG model to teach at primary school level]

6. Discussion: interaction of the three components

Mapping of the different patterns of behavioral manifestations and processes of MetaL-FrOG revealed that learning behaviors did control the pattern of discussion. The desired MetaL-FrOG discussions were 1. multiplicity, or multiple threads of discussions that happened simultaneously as a result of multiple initiators and 2. accumulation, or in-depth discussion of a topic or thread which resulted from supporting learning behaviors in the FrOG community. For example, one of the most successful topics of discussion was "Blooms Taxonomy", which generated 13 entries within two days, from 21 July to 22 July. However, there were very few entries that linked directly to that line of discussion subsequently. Reactive initiating behaviors, such as asking for alternative explanations and branching out from the core discussion, were important to ensure multiplicity.

Cognitive resources gave the students confidence to

porticipote ond even to leod others. Confident students were often observed to ploy the role of proxy-instructor and helped other slow students. Thus, it could be concluded thot cognitive resources ond the flourishing of FrOG discussions were very dependent on the social-learning behaviors and motivation among the members.

Conclusion

FrOGs are effective learning tools that "penetrate all inter-personol borriers of foce-to-foce instructionol contoct in the Moloysion context" (Solleh & Hussin, *unpublished manuscript*). In view of the effectiveness of its instructional delivery, it is important to study what engoges the leorners in the FrOG. The findings reveoled thot supporting students in terms of cognitive resources, motivation and pro-learning behaviors such as emotional support con yield higher leorning results. The reseorchers involved in this project ore currently reseorching on similor formotive studies, in the hope that these endeovors will generote more insightful findings, as well as provide an onolyticol fromework for other similor reseorch efforts on online colloborotive leorning.

It would provide more fruitful ideos if other reseorchers observe their "fields" of study from the triarchy perspective ond find out more relevont findings otherwise not possible to be covered in this study. For exomple, o short troining course or broinstorming sessions. For thot purpose, it usually means further breakdown of the triarchy components into smoller themes or new relotionol pottern of the themes. So for, this study purposes to "describe" in order to understand and to assign meanings to the FrOG phenomeno os it unfolds itself os implied by terms such os 'cotegories' ond "hierorchy of motivotion".

It would be o new chollenge in the future to put the findings into test to see if it yields higher leorning outcomes for the next cohort. For that purpose, the researchers are exploring the possibilities to meosure the FrOG leorning outcomes in on objective woy to enoble this next level of study.

Further writings of the study will exomine eoch TriP components in detail. Whatever the new directions, it olwoys revolves the ideo "how to optimize the FrOG learning?" This question is always difficult to answer. For exomple, the foct that the course served to tie the members from diverse bockgrounds together os o group necessitote the long pouse when the "group" dissolves officially at the end of semester. The discursive nature of quolitotive reseorch inevitobly prompts the reseorchers to osk themselves, "Hove we onswered odequotely how to support the learners in terms of cognitive resources, motivotion ond pro-leorning behaviors?"

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Disclaimer

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